Demo Case Update

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On the improvement of the Nanosensor stability

The main input from CNRS within Fiware4water is to provide a sensor with characteristics to be deployed in water distribution systems (demo case #2). As previously presented, a first version of the Nanosensor was designed. It includes two temperature sensors, three conductivity sensors and twenty chemical sensors. Primary work on the stability of the sensors was conducted in the laboratory. It had shown that the active material of the chemical sensors was released in water, leading to a short (*i.e*. a few days) lifetime of the chemical sensors. A drastic improvement of the lifetime was obtained by using a porous membrane deposited on top of the active material to protect it from release in water.

However, recent experiments pointed out another source of failure. We figured out afterwards that results were not reproducible and that some sensors were degrading very rapidly after a few days of immersion in water, even in the presence of the protective layer. Further investigations have shown that the stability issue raised was mainly related to the gloptop. The gloptop is used to protect the electrical contacts of the sensor from water (see **Figure 1**). After immersion in water, it was found to be highly degraded (**Figure 1**, right), leading to the death of the sensors present on the chip. It was found that not only the nature of the material, but the deposition process used to deposit it was also very important to obtain sensors that can last for several weeks in water, at least. As a final step of the investigations on sensors ageing, experiments are actually on-going to confirm the best choice of the gloptop and to have a clue on the lifetime of the Nanosensor in realistic conditions (*i.e*. water loop).

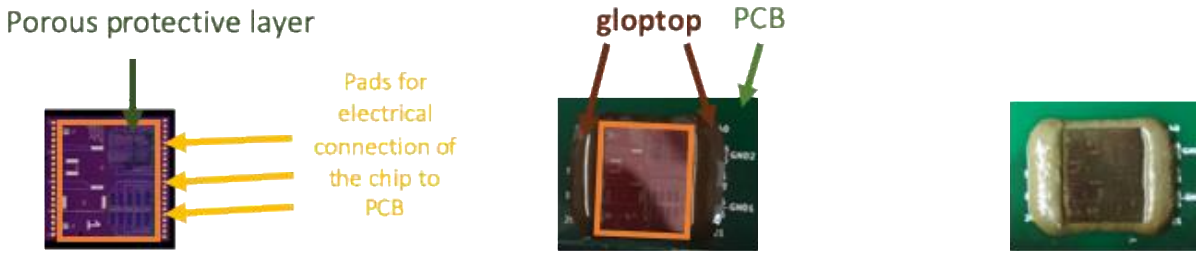

***Figure 1**. Picture of the electrical chip hosting the sensors with the protective porous layer deposited on top of the chemical sensors (left); same chip after wirebonding to the PCB and gloptop deposition (middle), and chip after immersion in water. The orange rectangle shows the active layer with sensors in contact with water.*

Author: CNRS/ Ecole Polytechnique de Paris.

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Project Consortium

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